CLAIMS

1   1.   A method for determining a correct amount of fuel to be

2   delivered to an engine to accomplish efficient combustion wherein the engine

3   is being re-started after a long or short shut-off period, said method comprising

4   the steps of:

5   providing a computer controller for controlling the delivery of fuel into

6   the engine via a fuel injection system;

7   providing at least one air/fuel sensor heater in communication with the

8   computer controller;

9   using the computer controller to determine a value of conductance of

10   said air/fuel sensor heater;

11   determining an amount of fuel that should be delivered to the engine

12   based on the value of conductance of the air/fuel sensor heater and at least one

13   other engine parameter; and

14   using the computer controller to cause the fuel injection system to

15   deliver the determined amount of fuel to the engine.

1   2.   The method of claim 1 wherein the step of using the computer

2   controller to determine the value of conductance is accomplished by direct

3   measurement at the air/fuel sensor heater.

1   3.   The method of claim 1 wherein the step of determining the

2   value of conductance comprises using the computer controller to calculate

3   conductance from measured impedance values at the air/fuel sensor heater.

1   4.   The method of claim 1 wherein the value of conductance

2   decreases as the shut-off period increases.

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4   5.   The method of claim 1 wherein the at least one other engine

5   parameter is engine coolant temperature and intake air temperature.

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7   6.   An apparatus for controlling an amount of fuel to be delivered

8   to an engine at restart, said system comprising:

9   at least one air/fuel sensor heater;

10   a fuel injection system; and

11   a computer controller in communication with said fuel

12   injection system and said at least one air/fuel sensor heater, said computer

13   controller operative to:

14   a) determine a value of conductance of said at least one air/fuel sensor

15   heater;

16   b) determine an amount of fuel that should be delivered to the engine

17   based on the value of conductance of the at least one air/fuel sensor heater and

18   at least one other engine parameter; and

19   c) cause the fuel injection system to deliver the determined amount of

20 fuel to the engine.

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